

RIC 2002

Session W1

Circumferential Cracking of RPV Head Penetration Nozzles

Larry K. Mathews
Inspection & Testing Services Manager
Southern Nuclear Operating Company
March 6, 2002

Important Experience

- PWSCC leakage through wall
 - Multiple plants
 - Multiple penetrations at some plants
- New crack locations/orientations
 - Weld metal axial and circumferential
 - Base metal OD & circumferential above the penetration attachment weld
- Very small quantity of boron deposit on head
- Re-inspection has identified previously undetected leaks
- Concern -- rod ejection accident/small break LOCA
- Time dependent degradation mechanism

Head Penetration Leakage



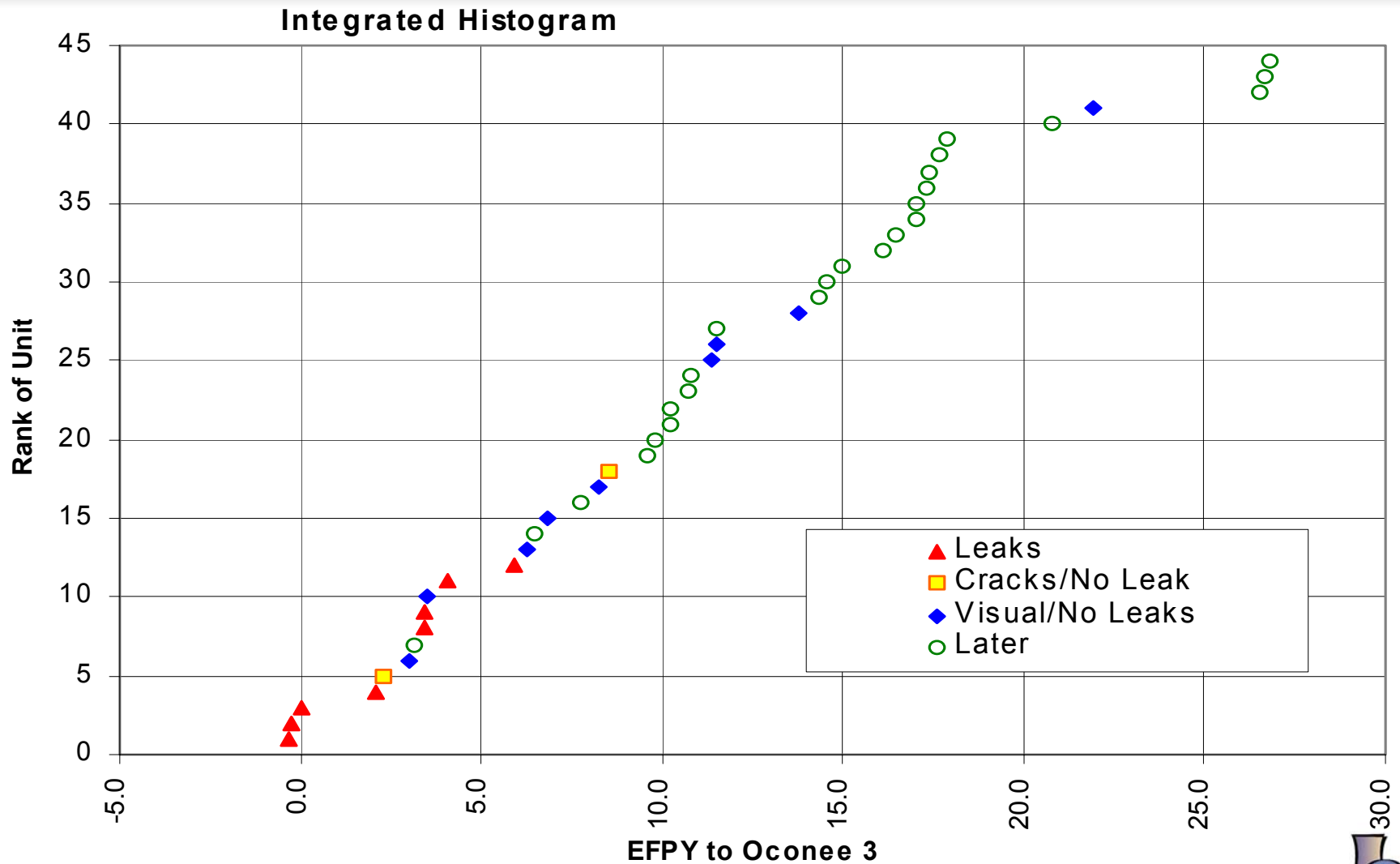
NRC Actions - BL 2001- 01

- Requested information
 - Assure NRC regulatory requirements
 - Visual examinations or under head surface/volumetric inspections based upon previous findings and susceptibility
 - All licensees responded
 - Most licensees committed to perform examinations/inspections
 - NRC closeout letters -- Being issued

Whose Doing What?

- MRP - Technical Lead, Coordination
- PWR Owners Groups - Non generic activities
- NSSS Vendors & Contractors - Support to resolve specific issues
- EPRI - Project management
- NEI - Regulatory interface
- ASME Section XI - Codify long term requirements
- INPO - Information exchange forum

Inspections Confirm Rankings



What's Been Found – To Date

- Over 1200 US PWR Penetrations Inspected Visually During 2001
- Approximately 31 Leaking CRDM Penetrations Found
- About 115 Penetrations Inspected - Volumetric or Surface (including leaking penetrations)
- Circumferential Cracks Above Weld Identified in 6 Penetrations

Future Inspections

Approximate Number of Plants

		Surface/Vol.
Outage	Visual	NDE*
Spring 02	13	6
Fall 02	7	4
Spring 03	1	2

* UT, ECT or PT

What's Happening?

- Update to Safety Assessment
 - Susceptibility ranking (Time and temperature based)
 - Crack growth rate expert panel
 - Base metal (Feb. 2002)/Weld Metal in process
 - Probabilistic fracture mechanics
 - Risk analysis
- Inspection guidance update and program development
 - Previous experience
 - NDE mockups and demonstrations
 - Safety Assessment
- Repair/mitigation options
- Utilities performing inspections and plant specific evaluations